**Amendment to the Claims:**

1. (Original) A system for locating a transmitter, where said system is geographically separated from the transmitter, said system comprising:

receiving means for receiving and digitizing a signal emitted by the transmitter to thereby produce a received signal;

means for determining a matrix pencil eigenvalue for at least a portion of said received signal;

means for determining the generalized eigenvalue decomposition of said matrix pencil eigenvalue;

means for determining a spatial variable of the matrix pencil eigenvalue from the generalized eigenvalue decomposition; and,

means for determining the location of the transmitter from the spatial variable to thereby locate the transmitter.

2. (Original) The system of Claim 1 wherein said spatial variable is a steering vector.

3. (Original) The system of Claim 2 further comprising means for determining the angle of arrival of the transmitted signal as a function of said steering vector.

4. (Original) The system of Claim 3 further comprising means for determining the geolocation of said transmitter as a function of said steering vector.

5. (Original) The system of Claim 1 wherein the signal has a received SNR less than 0 dB.

6. (Original) The system of Claim 1 wherein the signal has a SNIR less than 0 dB at the receiver.

7. (Original) The system of Claim 1 wherein the signal has a SNIR less than -6 dB at the receiver.

8. (Original) The system of Claim 1 wherein the means for determining the matrix pencil eigenvalue comprises a means for determining a higher-order statistic of the received signal.

9. (Original) The system of Claim 8 wherein the higher-order statistic is a fourth-order cumulant of the received signal.

10. (Original) The system of Claim 1 wherein the receiver means further comprises a multi-element sensor array.

11. (Original) In a method for locating a transmitter emitting a signal comprised of a plurality of symbols where the emitted signal is received by a receiver including an antenna with a plurality of antenna elements and a digitizer for providing a bit stream from the received symbols, the improvement comprising the step of determining a temporal dependence between bits of the bit stream indexed in time and determining the location of the transmitter from the temporal dependence.

12. (Original) The method of Claim 11 wherein the improvement further comprises the step of determining a matrix pencil eigenvalue for at least one of said symbols.

13. (Original) The method of Claim 12 wherein the improvement further comprises the step of determining the generalized eigenvalue decomposition of said matrix pencil eigenvalue.

14. (Original) The method of Claim 13 wherein the improvement further comprises the step of determining a spatial variable of the matrix pencil eigenvalue.

15. (Original) The method of Claim 14 wherein said spatial variable is a steering vector.

16. (Original) The method of Claim 15 further comprising the step of determining the angle of arrival of the emitted signal as a function of said steering vector.

17. (Original) The method of Claim 15 further comprising the step of determining the geolocation of said transmitter as a function of said steering vector.

18. (Original) The method of Claim 11 wherein the communication signal has a received SNR less than 0 dB.

19. (Original) The method of Claim 11 wherein the communication signal has a SNIR less than 0 dB at the receiver.

20. (Original) The method of Claim 11 wherein the communication signal has a SNIR less than -6 dB at the receiver.

21. (Original) The method of Claim 11 wherein the bits of the bit stream indexed in time are successive bits in the bit stream.

22. (Original) The method of Claim 11 wherein the step of determining the location of the transmitter includes determining the angle of arrival of the emitted signal at the antenna.

23. (Original) A method for locating an uncooperative transmitter with a receiver including a multi-element array antenna which is geographically spaced apart from said transmitter, wherein said transmitter emits a signal with an unknown waveform, comprising the steps of:

receiving and digitizing the emitted signal to thereby produce a received signal;

determining a matrix pencil eigenvalue for at least a portion of said received signal;

determining a spatial variable of said matrix pencil eigenvalue; and,

determining the location of the transmitter based on the spatial variable.

24. (Original) The method of Claim 23 wherein the step of determining the matrix pencil eigenvalue for the received signal includes the step of determining a spatial fourth-order cumulant.

25. (Original) The method of Claim 23 wherein said spatial variable is a steering vector of the communication signal.

26. (Original) The method of Claim 25 further comprising the step of determining the angle of arrival of the communication signal as a function of said steering vector.

27. (Original) The method of Claim 26 further comprising the step of determining the geolocation of said transmitter as a function of said steering vector.

28. (Original) The method of Claim 23, wherein the step of receiving and digitizing includes the step of organizing the digitized bits into blocks of data comprised of sequential snapshots wherein said snapshots are each comprised of a bit from each element of said multi-element array antenna.

29. (Original) The method of Claim 28 wherein the matrix pencil eigenvalue is determined from said blocks of data.

30. (Original) The method of Claim 29 wherein said block of data includes approximately 5000 snapshots.

31. (Original) The method of Claim 23 wherein the communication signal has a received SNR less than 0 dB.

32. (Original) The method of Claim 23 wherein the communication signal has a SNIR less than 0 dB at the receiver.

33. (Original) The method of Claim 23 wherein the communication signal has a SNIR less than -6 dB at the receiver.

34. (Original) The method of Claim 23 further comprising the steps of determining a generalized eigenvalue decomposition of the matrix pencil eigenvalue and determining the spatial variable from the generalized eigenvalue decomposition.

35. (Original) The method of Claim 23 wherein the step of determining the matrix pencil eigenvalue further comprises the step of determining a higher-order statistic.

36. (Original) The method of Claim 35 wherein the higher-order statistic is a fourth-order cumulant.

37. (Withdrawn) In a receiver including an antenna with a plurality of antenna elements for receiving a signal and a digitizer for providing a bit stream of the received signal, the improvement comprising means for determining a temporal dependence between bits of the bit stream.

38. (Withdrawn) The receiver of Claim 37 wherein the means for determining a temporal dependence further comprises means for determining a matrix pencil eigenvalue for at least a portion of the signal.

39. (Withdrawn) The receiver of Claim 38 wherein the means for determining a temporal dependence further comprises means for determining the generalized eigenvalue decomposition of said matrix pencil eigenvalue.

40. (Withdrawn) The receiver of Claim 39 wherein the means for determining a temporal dependence further comprises means for estimating a steering vector from the matrix pencil eigenvalue.

41. (Withdrawn) The receiver of Claim 40 further including means for determining the angle of arrival of the signal.

42. (Withdrawn) The receiver of Claim 41 wherein the angle of arrival is determined based on the temporal dependence.

43. (Withdrawn) The receiver of Claim 42 wherein the means for determining the angle of arrival further comprises means for determining the angle of arrival as a function of said steering vector.

44. (Withdrawn) The receiver of Claim 38 wherein the means for determining the matrix pencil eigenvalue comprises a means for determining a higher-order statistic of the received signal.

45. (Withdrawn) The receiver of Claim 44 wherein the higher-order statistic is a fourth-order cumulant of the received signal.

46. (Withdrawn) The receiver of Claim 37 wherein the signal has a received SNR less than 0 dB.

47. (Withdrawn) The receiver of Claim 37 wherein the signal has a SNIR less than 0 dB at the receiver.

48. (Withdrawn) The receiver of Claim 37 wherein the signal has a SNIR less than -6 dB at the receiver.

49. (Withdrawn) The receiver of Claim 37 wherein the bits of the bit stream are successive bits in the bit stream.

50. (Cancelled)

51. (Currently Amended) ~~The method of Claim 50~~ A method for determining the geolocation of a transmitter which emits a signal received by a receiver with a known location and determining the angle of arrival of the received signal, comprising the steps of determining a higher-order statistic of the received signal and estimating the angle of arrival as a function of the higher-order statistic, wherein the higher-order statistic is a fourth order cumulant.

52. (Original) The method of Claim 51 further comprising the step of determining a matrix pencil eigenvalue from the fourth order cummulant.

53. (Original) The method of Claim 52 further comprising the step of determining the generalized eigenvalue decomposition of the matrix pencil eigenvalue.

54. (Original) The method of Claim 53 further comprising the step of determining a non-orthogonal eigenvector from the eigenvalues corresponding a steering vector of the transmitted signal.

55. (Original) The method of Claim 54 further comprising the step of determining the AOA from the non-orthogonal eigenvector.

56. (Original) A method of tracking a transmitter emitting a signal with a known unique temporal characteristic, comprising the steps of:

receiving and digitizing a plurality of candidate signals to thereby produce a plurality of candidate received signals;

for each of said candidate received signals:

determining a matrix pencil eigenvalue;

determining a temporal characteristic;

determining a spatial variable of said matrix pencil eigenvalue;

associating the spatial variable with a temporal characteristic of the candidate received signal;

correlating the temporal characteristics of each candidate received signal with the known unique temporal characteristic; and,

retrieving the spatial variables associated with temporal characteristics of the candidate received signals that are highly correlated with the unique temporal characteristic to thereby facilitate tracking the transmitter.

57. (Original) The method of Claim 56 wherein the step of determining the matrix pencil eigenvalue for each candidate received signal includes the step of determining a higher-order statistic.

58. (Original) The method of Claim 57 wherein the higher-order statistic is a spatial fourth-order cumulant.

59. (Original) The method of Claim 56 wherein said spatial variable is a steering vector of each candidate received signal.

60. (Original) The method of Claim 59 further comprising the step of determining the angle of arrival of each candidate received signal as a function of said steering vector.

61. (Original) The method of Claim 60 further comprising the step of determining the geolocation of said transmitter as a function of said steering vector.

62. (Original) In a method for determining the angle of arrival of a signal received at a receiver having a multi-element antenna array, the improvement comprising the step of determining the angle of arrival based on non-orthogonal eigenvectors selected from a generalized eigenvalue decomposition of a matrix pencil eigenvalue created from a fourth order cummulant of the received signal.